

2.3 AIR QUALITY

2.3.1 Affected Environment

A study of the potential air quality effects of the security action was conducted as part of this environmental assessment. This section addresses the security action, describes the current regulations, and presents the framework for the analysis.

2.3.1.1 National Ambient Air Quality Standards

The Clean Air Act of 1970 (CAA70) provided the mandate for the U.S. Environmental Protection Agency (EPA) to protect the public health by regulating air pollution. The EPA has established the National Ambient Air Quality Standards (NAAQS) for several major air pollutants, referred to as "criteria pollutants." The NAAQS for these criteria pollutants are shown in Table 2-7.

The NAAQS for several of the criteria pollutants were developed for multiple exposure times, based on the observed health responses to varying pollutant dosage and exposure. The observations clearly showed that, given longer exposure times, adverse health effects occur at substantially lower doses; e.g., both one- and eight-hour average standards were developed for carbon monoxide (CO) exposure. Each of the pollutants regulated by the NAAQS are described below.

2.3.1.2 Pollutants of Concern

Oxides of Sulfur (such as sulfur dioxide) are respiratory irritants associated with acid-gas and acid-rain formation. These pollutants are most frequently emitted as a result of the combustion of sulfur-containing fuels (such as heating oil) and are, therefore, not associated with mobile sources of pollution (such as motor vehicles).

Lead emissions have been, and continue to be, substantially reduced as a result of the reduction of the amount of lead contained in gasoline. Microscale lead analyses for highway projects are not warranted.

Inhalable Particulate Matter is matter that is smaller than 10 microns in diameter and is referred to as *PM₁₀*. This pollutant, a respiratory irritant, is primarily generated by stationary sources but is also produced by the combustion of diesel fuel, which is used by most buses and by some heavy trucks. Often, *PM₁₀* levels are associated with vehicular travel over unpaved areas, which drags and subsequently re-entrains dust into the air. *PM₁₀* is not currently a concern in Washington D.C. nor are elevated *PM₁₀* levels associated with an essentially gasoline-fueled vehicle fleet such as is operated in this metropolitan area.

Gasoline-powered vehicles emit both Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (*NO_x*).

Oxides of nitrogen, such as *NO₂*, are reactive oxidants that, besides helping to form Ozone, are also associated with the formation of acid rain. Photochemical oxidants, such as hydrocarbons and other organic compounds, are reactive pollutants that act as the precursors to the formation of ozone in the presence of sunlight. This reaction occurs fairly slowly, and typically downwind of the emissions source. Thus, the effects of these pollutants are typically a regional concern and are analyzed on a regional basis (i.e., as part of a mesoscale study).

Ozone is an irritative reactive gas that has adverse health effects on human, animal, and plant life.

Although transportation sources do not emit ozone, they do emit its precursors (i.e., NO_x and VOCs). The cumulative effects of transportation projects on these pollutants are a function of changes in regional vehicle miles traveled (VMT) and are analyzed as part of the State Implementation Plan (SIP) / Transportation Improvement Plan (TIP) conformity.

Carbon Monoxide is a colorless, odorless, and toxic gas that results primarily from the incomplete combustion of fossil fuels such as gasoline. High concentrations of CO are frequently associated with roadways that experience high vehicular volumes, low travel speeds, and traffic congestion. Carbon monoxide disperses rapidly with distance from the emissions source. Thus, local ambient CO concentrations are an issue of concern for projects that affect local roadway volumes and congestion.

Ozone and its precursors (NO_x and VOCs) are typically associated with transportation projects that can have material effects on regional travel. Since, on a regional level, the restriction of vehicular traffic on a few streets does not affect regional travel patterns or VMT, these pollutants are not of concern for this security action. However, the action does affect local traffic patterns, making local ambient CO concentrations a potential concern.

Table 2-7
National Ambient Air Quality Standards

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Sulfur Dioxide (SO₂)				
Annual Arithmetic Mean	0.03	80		
Maximum 24-hour Concentration*	0.14	365		
Maximum 3-hour Concentration*			0.50	1,300
Lead (Pb)				
Maximum Arithmetic Mean Averaged over 3 Consecutive	1.5			
Inhalable Particulate Matter (PM₁₀)				
Annual Geometric Mean		50		50
Maximum 24-hour Concentration*		150		150
Nitrogen Dioxide (NO₂)				
Annual Arithmetic Average	0.05	100	0.05	100
Ozone (O₃)				
1-hour Maximum	0.12	235	0.12	235
Carbon Monoxide (CO)				
Maximum 8-hour Concentration*	9	10**	9	10**
Maximum 1-hour Concentration*	35	40**	35	40**

*These values are not to be exceeded more than once per year.

ppm = parts per million

µg/m³ = micrograms per cubic meter

**mg/m³ = milligrams per cubic meter

Sources: 40 CFR Part 50 -- National Primary and Secondary Ambient Air Quality Standards
40 CFR 50.12 -- National Primary and Secondary Standards for Lead

2.3.1.3 Attainment Status of the Extended Study Area

Title I of the Clean Air Act Amendments of 1990 (CAAA90) requires that each region of the country be designated as either being in "attainment" or being in "non-attainment" of the standards for each criteria pollutant. For non-attainment areas, the severity of non-attainment is also designated and is determined by the degree to which air quality measurements exceed the NAAQS; this determination also defines the available time frame and the level-of-effort required for bringing the area into attainment.

Washington, D.C. has been designated as follows for the indicated criteria pollutants:

- a serious non-attainment area for ozone,
- an attainment area for CO, and
- an attainment area for PM₁₀.

The attainment requirements of the CAAA90 require stricter traffic and emission control measures to bring non-attainment areas into attainment. For Washington, D.C., such control measures are the vehicle inspection maintenance (I/M) program and the anti-tampering program (ATP) to reduce average fleet emission rates. The District is currently preparing to implement an enhanced I/M program in July of 1997. In addition to these programs, average fleet emissions tend to decrease as time progresses, since older automobiles that typically produce more pollution are retired and replaced with newer vehicles that have better emission-control systems.

The District's Implementation Plan, following the requirements of the CAAA90, has set forth a schedule to bring the criteria pollutant ozone into compliance. The attainment goal for the Washington, D.C. area for ozone is 1999. In 1995, the District was redesignated as being in attainment for CO.

2.3.1.4 Conformance of the Security Action with Regulatory Requirements

Under the NEPA EA process, the potential for all environmental impacts, including those that pertain to air quality, must be assessed and disclosed. The air quality assessment performed for the security action fulfills this NEPA requirement.

All new or ongoing federal or federally-regulated projects must be assessed with respect to the conformity regulations of the Clean Air Act of 1970 (CAA70) and its 1990 amendments (CAAA90). Since the security action was not undertaken by the FHWA or FTA (40 CFR Part 51.394(2)), and was not adopted, supervised, or approved under title 23 U.S.C. or the Federal Transit Act (40 CFR Part 51.450), the security action is not subject to the Transportation Conformity Section of the CAAA90. Actions by non-transportation agencies are assessed with respect to the General Conformity Section of the CAAA90.¹

¹ The implementing guidance for the General Conformity regulations of the CAAA90 are given in Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, 40 CFR Parts 6, 51 and 93, published Tuesday, November 30, 1993 in the Federal Register, Vol. 58 No. 228, pages 63213-63259.

A federal action is defined as *regionally significant* under General Conformity if for the purpose of determining the applicability of General Conformity and the need for a *conformity determination*, its *direct or indirect emissions* exceed *de minimis* values specified in the General Conformity regulations for each criteria pollutant (see Table 2-8). *Regionally significant* actions must either be found to conform with the applicable State or Federal Implementation Plan (SIP) or undergo a *conformity determination* to insure that their associated emissions are accounted for appropriately and sufficiently offset by the region.

Table 2-8
***De Minimis* Criteria For General Conformity**

Pollutant	<i>De Minimis</i> Tons/Yr
Ozone(VOCs or NO _x)	50
CO	100
SO ₂ and NO ₂	100
PM ₁₀	100
Pb	25

Source: 23 CFR 51.853

For the purpose of determining the need for a *conformity determination*, *direct emissions* are defined as those which directly result from the action. *Indirect emissions* are defined as emissions that may occur farther away or later in time from the action, but are both reasonably foreseeable, and for which the acting agency maintains responsibility through ongoing program control. *Direct emissions* from the action (which were limited to those that arose from placing restrictive barriers) are negligible.

The other effects on emissions are associated with traffic changes. The Department of the Treasury does not maintain responsibility for traffic effects through ongoing program control. Thus, for the purpose of assessing the status of the security action with respect to General Conformity, the traffic emissions which result from traffic changes are not added as *indirect emissions* associated with the action. Since the total direct and indirect emissions of the action are below the *de minimis* threshold, the security action is not considered to be *regionally significant* and does not require a conformity determination under the General Conformity Section of the CAAA90. However, the NEPA analysis followed the same modeling procedures that would have been used for a conformity determination.

The security action has had minimal effect on regional emissions, and therefore, is not expected to interfere with the District's maintenance or attainment of standards. The security action could potentially have affected ambient pollutant concentrations. Since CO is the only pollutant of potential concern for the security action, the air quality study addresses the security action's effects on ambient CO concentrations.

2.3.2 Impacts Analysis

Shortly after the initial vehicular restrictions, H Street and I Street were made one-way only and some signal operations changes were implemented to facilitate traffic flow. The air quality analysis modeled maximum potential CO concentrations, using conservative modeling assumptions, with traffic analysis performed for the security action. Traffic data for the analysis include those changes in traffic operations associated with the security action.

In addition to the assessment of existing conditions, the effect of traffic from the Ronald Reagan Building, currently under construction, was assessed. These results are described in the section on cumulative impacts of the security action.

Conditions before the action cannot be modeled because specific input data for the modeling process were not collected prior to implementation of the security action. Therefore, the "No Build" scenario conditions have not been assessed.

2.3.2.1 Analysis Methodology

For each selected analysis location, scenario, and for both the AM and PM peak periods, the maximum potential one-hour and eight-hour average concentrations were projected. Vehicular emissions were estimated using the EPA MOBILE 5a² emissions model for January (winter) of 1997. Pollutant dispersion was calculated using the CAL3QHC³ (Version 2) screening model.

Mathematical modeling of complex physical phenomena, such as air flow and pollutant dispersion, can only be accomplished through the use of simplifications. These simplifications are formulated so as to be conservative under the worst-case conditions. Therefore, the models conservatively over-predict CO concentrations, especially under the worst-case meteorological conditions. Consequently, CAL3QHC was run with EPA-recommended conservative screening assumptions.

To determine total ambient concentrations at a given location, the locally induced pollutant concentrations, calculated with CAL3QHC, were added to the background concentration. The 1-hour average CO concentrations were calculated by summing the CAL3QHC results with the 1-hour average background value. The 8-hour average results were calculated by applying an EPA-recommended "persistence factor" of 0.70 to the CAL3QHC result, and then adding the 8-hour average background value. The "persistence factor" represents the decrease in the average 8-hour concentration relative to the peak 1-hour concentration. This decrease is caused by fluctuations in the wind's direction and speed, decreases in traffic volumes from the peak hour, and other time-dependent factors.

²User's Guide to MOBILE 5 Mobile Source Emission Factor Model Report #EPA-AA-AQAB-94-01 E.P.A. Office of Air & Radiation & Office of Mobile Sources, Ann Arbor, Michigan, May 1994

³User's Guide to CAL3QHC Version 2, A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections, Office of Air Quality, Planning Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina

2.3.2.2 Model Inputs

Vehicle-mix data, basic I/M program and ATP parameters, registration distribution, and trip length data that were input to MOBILE5a were obtained from the Metropolitan Washington Council of Governments (MWWOG). The District projects a transition to an enhanced I/M program (I/M 240) as early as June of 1997. Therefore, a basic I/M Program was assumed for the 1997 calculations, and an enhanced program assumed for the 1997 cumulative impact calculations.

Speed data were obtained from observed average corridor speeds. Because the dispersion model (CAL3QHC version 2) requires running (green-phase) speeds, the data were collected to obtain both average speed and stopped delay as a fraction of total travel time.

Background concentrations for 1997 were based on data⁴ that provide background concentrations for 1993 and 1998 model years. These values were obtained via "rollback" from earlier data, whereby the decreasing fleet-average emission factors for the years of concern are applied to a known set of background concentrations to obtain future concentrations. The background concentrations used in the 1997 analysis of the security action are 2.48 parts per million (ppm) for the 1-hour average and 1.49 ppm for the 8-hour average. The background value used in the 1999 analysis of cumulative impacts with the Ronald Reagan Building are 2.12 for the 1-hr average and 1.27 for the 8-hr average.

2.3.2.3 Selection of Analysis Locations

Analysis locations were selected to include the worst-case locations affected by the security action. High CO concentrations are frequently associated with roadways that experience high vehicular volumes, low travel speeds, and traffic congestion and queuing. The following locations were selected as worst-case sites for CO analysis:

- K Street at Connecticut Avenue / 17th Street
- I Street at Connecticut Avenue / 17th Street
- Pennsylvania Avenue at 17th Street
- 14th Street at H Street / New York Avenue
- Constitution Avenue at 14th Street and at 15th Street

The H Street and I Street locations were selected because their travel directions were modified in the June traffic management response. They now carry different traffic volumes than they did before the security action. The locations at Pennsylvania Avenue at 17th Street and Constitution Avenue at 14th and 15th Streets were chosen because they carry higher volumes of east/west traffic diverted by the security action. The selected locations are shown in Figure 2-6.

⁴The Barney Circle Freeway Modification Project Environmental Assessment, D.C. Dept. of Public Works and FHWA, August 1995

2.3.2.4 Results

The highest results for each analyzed location are shown for 1997 conditions in Table 2-9. The NAAQS would not be exceeded at any analyzed location in either peak travel period. Maximum projected CO levels at the heavily traveled Constitution Avenue intersection and the congested 14th and H Streets / New York Avenue intersections are predicted to approach but not exceed the NAAQS 8-hour CO standard.

The highest projected CO concentrations are below the NAAQS and the security action would not affect regional emissions. Therefore, there would be no air quality impacts associated with the security action: the security action conforms to the Washington, D.C. Implementation Plan.

The highest results for 1999 conditions which include the effects of both the traffic generated by the Ronald Reagan Building and the integrated traffic management system (ITMS) are shown for each 14th Street location in the cumulative impacts section. None of these results exceed the NAAQS at either location for either peak travel period. The PM period results for 14th and H Streets / New York Avenue are much lower than for 1997 conditions due to the beneficial effects of the ITMS project.

Table 2-9
Maximum Ambient Carbon Monoxide Concentrations (ppm)
1997 Analysis of Effects of the Action - AM and PM Peak Periods

	Analysis Location	1-hour (NAAQS = 35.0 ppm)		8-hour (NAAQS = 9.0 ppm)	
		AM	PM	AM	PM
1	K St. @ 17th St. - West	8.1	12.1	5.4	8.2
	K St. @ 17th St. - East	7.8	8.4	5.2	5.6
2	I St. @ 17th St. - West	8.8	12.1	5.9	8.2
	I St. @ 17th St. - East	8.1	10.7	5.4	7.2
3	Pa. Ave. @ 17th St.	9.7	11.0	6.5	7.4
4	14th St. @ H St. & New York Ave.	8.3	12.8	5.6	8.7
5	Const. Ave. @ 14th St.	10.9	12.4	7.4	8.4
	Const. Ave. @ 15th St.	11.4	11.5	7.7	7.8

NOTES:

1. 1-hour Background Concentration = 2.48 ppm
2. 8-hour Background Concentration = 1.49 ppm

Figure 2-6: Air Quality Analysis Locations

